

THE DOMINATING WORLD-VIEWS OF SCIENCE AND TECHNOLOGY: RESPONSES FROM CHRISTIANITY

CW du Toit¹

University of South Africa

1. Introduction

World-views are the pleasant stories with which generations identify in order to explain themselves and the world in which they live. A world-view is the harmonious picture made up of all the jigsaw pieces of life. These pieces all seem to fit precisely into place and normally none of them is missing. The larger picture integrates many smaller scenes which explains how scientists, philosophers, writers, workers and different interest groups view life. If one stands back, a holistic picture emerges, made up of all these smaller scenes. In the world-view gallery it is possible to view the pictures of previous ages, histories, and cultures and to mark the similarities and differences between them. The nearer one comes to the present age the more complicated and indistinct the picture seems to become - as if one is looking at the many faces in a crowd.

Many people today do not believe in smoothly constructed pictures explaining away all of life's paradoxes. The many conflicting pictures available on the contemporary world-view market are so confusing that people often feel safer not to adhere to any one of them.

In South-Africa we have many conflicting world-views which have not been explicitly and sufficiently dealt with. These conflicting world-views concern all spheres of life, from the religious to the political and the scientific. It makes no sense to try and further the study of the natural sciences, for example, without investigating what world-view has to do with the fact that so few black students show an interest in these sciences. Although this is a complex issue, we have to determine all the relevant contextual, cultural and religious factors that make up world-views in this country. We need to know to what extent world-views overlap or share mutual values and to what extent they are affected by the same technology and influences.

It is difficult to point out exactly or measure the world-views operative in a society, to indicate how they were shaped, how one world-view was effaced and how a new one came to be born. World-views are shaped and reshaped in a process of cultural interaction. Different interpretations and world-view models seem to compete in free market fashion for dominance. The social dynamic operative in any given context determines the outcome of world-view dominance. We are discovering that conflicts in life and science can be traced back to differences in underlying world-views (Olthuis 1985:153). Some people hang on to old world-views, trying to preserve them, while others maintain that we are in desperate need of a new world-view.

But let us take a closer look at what the world of world-views is all about.

1.1 The world of world-views

The world-view one holds refers to the way in which one understands oneself and one's world, the view one has on ultimate questions such as where one is coming from and where one is going, what one's place in the world is and how one can live a meaningful life. No

¹ Head, Research Institute for Theology and Religion, University of South Africa.

single definition can adequately explain the term which includes a multiplicity of models, perspectives, and contexts. A world-view includes the philosophical, theological, scientific and popular surveys of the world.

One can consider the world as a text and a specific world-view as the text reading and interpretation of that text. No text reading can claim to be the final or legitimate one. Existential need demands that a world-view must be something you can live with. It has to answer the need for belonging and security, for explaining whence we come and where we are heading; why things are as they are, and the meaning of life. For this reason world-views stay in place even when they no longer give satisfactory answers on all aspects of life.² World-views are consequently positive. No world-view exists which can be typified as absolutely depressing, humanly degrading and demoralising.

Feyerabend (1994b:152) defines a world-view as a collection of beliefs, attitudes and assumptions that involves the whole person - not only the intellect - and has some kind of coherence and universality and imposes itself with a power far greater than the power of facts and fact-related theories. World-views are always necessarily generalisations made from some aspect of the world as it is experienced. An organic world-view is developed from observing organisms. A mechanistic world-view is formulated from observing machines. A spiritual world-view is formed through observing particular qualities of human experience. A dualistic world-view answers both to human self-experience as mind and human experience of the world as matter (Cobb 1988:101).

For Olthuis (1985:155) a world-view is a set of fundamental beliefs explaining our calling and future in the world. It is the integrative and interpretive framework by which order and disorder are judged, the standard by which reality is managed and pursued.

The idea of a world-view is, strictly speaking, conservative and can be associated with closed system of thought. In older societies a well-defined world-view dictates the important beliefs and issues which codetermine the life-style of that society. Such a world-view is normally intolerant to other world-views and refuses reinterpretations of its own. It also conveys the values implicit in such a world-view.

An intolerant world-view is not feasible any more in a world where cultural interaction and a dynamic plurality of constantly changing ideas compete with each other. World-views, in the sense of a particular belief system of how everything fits together, may seem to have become redundant³ in a world where technology and pragmatism, the free-market system and science determine in a self-evident way our way of life. Modern society seems to operate without any specific articulated and prescriptive world-view. This may explain the modern experience of radical homelessness. Behind the surface of a pragmatic, pluralistic, modern and informed society, however, one could find very specific world-views.

1.2 World-views are provisional, dynamic and interactive

World-views are not absolute. They are culturally bound and reflect the time and space in which they were developed. There is of course a continuing influence, whether positive

2 World-views may be believed in, but with reservation. One finds, for example, that, although the dominant world-view of science accepts evolution and the variety of models that explain it as self-evident, it is not accepted indiscriminately when it clashes with peoples' personal beliefs. Some church members accept only evolution within species, because this can be harmonised with the biblical view that God created different species.

3 This is without doubt the case with Christianity, Judaism and Islam, to name but three religions, whose creation stories cannot be understood in a literal way any more.

or negative, between one world-view and another. No world-view develops or undergoes changes in a vacuum. A world-view reflects reality as it is perceived and not as it is 'in itself'. It is impossible to know reality as it is in itself, because reality is always interpreted reality. Reality will always be perceived through the lenses of tradition, in which all the factors that make up a civilisation play a role. According to Bohm (1988:62) the fact that relativity and quantum theory together overturned Newtonian physics shows the danger of complacency about world-view. It proves the provisional and exploratory nature of world-views. World-views need not be dogmatic and should reflect the feeling of their time. A world-view normally has a kind of elasticity which allows it to accommodate differences and seemingly incompatible ideas. This property explains the strength of world-views. When incongruous claims become unbearable a world-view will change - as a paradigm changes in natural science.

World-views in modern society have a dynamic nature. The fact that they may change rapidly causes many people to have a specific opinion on something rather than a firm belief. A world-view is, however, not simply a world-opinion, or a world-hypothesis, but a specific conviction of the way things are. Modern man's opinions cannot satisfy in the way that a commitment to a firm belief can. Although we still have our belief systems, they are complemented by opinions on science and technology, if we accept that science still offers the only solution to humankind's dilemmas. In spite of the commitment to science and technology, our knowledge of it is not too reliable. The science we do know we acquire second-hand, often on the vaguest authority, without knowing how it operates, or influences present-day values and belief systems.

The intellectual history of the West shows how the history of science is interwoven with the history of everything else and therefore also influenced by cultural changes. Throughout history world-view traditions have employed the scientific models of the day. The influence is, however, reciprocal. Science influences world-views, but world-views also influence science (Holmes 1983:43-44). The human sciences have been drafted on the blueprint of the methodology of the natural sciences, but the humanities also affect the natural sciences. Scientists are not always keen to admit that world-views and personal belief influences their scientific work, which is of course difficult to prove. No scientific fact can, however, be understood apart from all the intra- and meta-facts that make up the scientific world. The world of science, again, is embedded in the culture and life of its time. Although a specific world-view may seemingly be influenced by one dominant aspect, it is normally embedded in a context where many other factors codetermine its profile. All the factors of life - biophysical, emotional, rational, socioeconomic, ethical, and 'religious' - affect world-view formation simultaneously and interdependently, one dominating the others at one stage, while another might take the dominant position at another time. This can explain the many diametrically opposed world-views with their competing claims (Olthuis 1985:155).

Although world-views may seem to change rapidly today, they still seem to maintain to some degree a universal nature, because of the consistency of the values underlying them. World-view may exert a very indirect influence on society. In this regard it has often been assumed to be the prime mover of the historical process, basically affecting - rather than being affected by - its psychosocial context (Olthuis 1985:154).

1.3 World-view as story

The world-views operative in a culture are the master stories by which its members live. A world-view's effectiveness depends upon the success of the stories which embody it. For some, the important stories of our time may be the great competing scientific paradigms, for

others they may be the cultural history of our time. According to Swimme (1988:47ff) the activity of story-telling is central to the political and economic activity of our time. These stories are of vital importance, for they are not only responsible for the cohesion of each society, but they also contribute to the transformation of societies. 'Story' in this sense is 'world-interpretation', reflecting the nature and value of things in this world.

No religion can ignore the present new cosmology story told by scientists. It affects and has critical consequences for the identity of all the religions of the world. This story concerns the view religions have of God, creation, man, redemption, eschatology, and so on. The cosmic creation story has the potential to dislodge and even displace entirely all previous world-views. Suddenly, the human species as a whole has a common cosmic story. Islamic people, Hopi people, Christian people, Marxist people, and Hindu people can all agree in a basic sense on the birth of the sun, on the development of earth, on the development of life, and human cultures. For the first time in our existence we have a cosmic story that is not tied to one cultural tradition or to a political ideology, but instead gathers every human group into its compass. This pan-human story is already taught on every continent and within every major cultural setting.

It would, however, be detrimental to religions if their stories were to be replaced by one universal story which, through its claims on exclusive truth, objective proof and scientific interpretation, were to reduce religious stories of creation, salvation and meaning to mythical and culturally outdated artifacts.

On a positive note, it may be said that a universal cosmological story may have the ecumenical advantage of converging the stories of the different religions and of linking different religions by the mutual world-view and value system developed from this universal cosmological story. This would also be detrimental to the world of religions because the spirituality, attraction, meaning and value systems of world-religions are intimately bound to these stories. No matter how much a scientific theory reflects the beauty and symmetry of physics, how much it indicates the tremendous fine-tunedness of the universe that made life on our planet possible or develops a value system vital for the future of humankind - it remains a scientific theory and cannot become a religion.

The fact is, the new cosmology story is being established on a global level - in science, education, entertainment, value systems and the like.

It is a question, however, whether the story of the new cosmology will remain uncontaminated and whether it will be allowed to be reinterpreted in the light of new evidence, to be adapted to different cultures and in future contexts, whether it will be allowed to be told in different versions by poets and children. And, apart from the story itself - what will become of the values underlying it, the ideological potencies and so on?

The point in question is, however, whether one can still believe in one's world-view if it has been proved wrong? The answer is perhaps both 'yes' and 'no'. 'Yes', in so far as one must hold to one's world-view because the stories from one's tradition with their values, sentiments and attitudes, still have their place. 'No', in so far as one must adapt to the most credible and acceptable information available. One can foresee that differing religious stories will in future exist in juxtaposition with that of new cosmology.

2. World-view development in the West outgrowing its Christian matrix

A world-view claims to give the true picture of reality. Reality, however, seems to change and so do the world-views used to describe it. A world-view is one of the most important hermeneutical keys to unlocking a culture's understanding of reality. The basic outlines of a Christian world-view as it developed historically is presupposed and only

certain points are highlighted to indicate the interaction with scientific world-view development.

The history of the Western world is often divided into developmental phases. These phases have their own particular world-views. Dilthey (see Holmes 1983:32) distinguished the pretheoretical beginning of a world picture (*Weltbild*) from the world-view out of which it arises and which leads to a formulated world-view (*Weltanschauung*). Dilthey identified naturalism (where a scientific attitude rules), objective idealism (where feelings and ideals predominate as in Plato and Hegel), and the idealism of freedom (where personal freedom and a sense of obligation prevails) as three basic types of world-view that recur throughout history (Holmes 1983:32). Van Peursen (1975:32-111) distinguished the mythical,⁴ ontological and functional phases in the developmental history of the West, each with its distinctive world-views. Others believe that we moved from the mythical to the religious to the scientific phases. One could also distinguish the premodern, modern, and postmodern phases of history. These phases may be distinguished but not separated, since one may find all of them in one society.

Four models in the history of science have been indicated by Kuhn in his renowned book *The structure of scientific revolutions* (quoted by Holmes 1983:42):

- The Pythagorean model, based on the view that nature has a mathematical order, was extended by Plato into a theory of the universal forms and gave shape to the classical world-view stressing rational contemplation and harmonious unity as the marks of both justice and beauty, as well as mystical union with the divine.
- Aristotelian science turned attention more to change in nature and human art, stressing final causes or ends. A teleological world-view emerged, suggesting a hierarchical arrangement in both creation and society and a natural law ethic based on humanity's essential ends.
- Renaissance and Newtonian science, by contrast, abandoned final causes and explained the world in terms of matter and motion only - the mechanistic model often linked to a 'billiard ball universe'.
- Nineteenth and twentieth-century science remodelled the mechanistic model by energistic physics, by Einstein's relativity theory, and by developmental biology, into the conception of a relational process of a more organic sort - like a force-field or a biosystem.

The Christian view of history, dominating Western Europe in the Middle Ages, perceived life as a mere stopover in preparation for the next. During the Middle Ages history was seen as having developed from a specific proctology - the creation of God - to a specific eschatology and the final judgement. The redemption of Christ made it possible for humankind to be saved and, although some progression may be possible, the original sin of

4 One should not underestimate the impact which the *mythical world-view* had till late in the seventeenth century. Whereas the Aristotelian tradition had emphasised the teleological element in all things, the magical tradition sought to ally itself with the spiritual forces immanent in all things for human use and control. The primary objection against this tradition was not that it was unscientific, but that it threatened belief in a creator God who transcended nature (Cobb 1988:103).

humankind has made it impossible for man to improve his fate in life.⁵ All developments on earth were part of God's divine scheme and nothing could happen outside his will.

The modern period, in contrast, sought perfection in this world and not in the next. The modern world-view was promoted by Jacques Turgot (Rifkin 1980:15ff) who took on Plato, Aristotle, Saint Paul, Augustine and other great thinkers of the medieval world. Turgot considered history as cumulative and progressive, showing an overall advance toward the perfection of life here on earth. The modern age is the machine age. The universe itself is a grand machine set in motion aeons ago by a supreme technician, God, who engineered it so perfectly that it can run by itself (Deism). Progress is geared toward the perfection of the machine (Rifkin 1980:17-18). Progress would be developed as the new meta-narrative of the West, replacing the one of Christian hope and eschatology. The modern world-view has also been described as the change from the transcendental to the immanent. This created the feeling that man has lost his place in the world. It is only natural law that keeps everything together.⁶ The history of modern natural science to a great deal has been a history of the emancipation of science from theological presuppositions (Pannenberg 1993:73).

By the middle of the eighteenth century most elements of the mechanical world-view had been integrated into a unified scheme, which was influenced predominantly by Francis Bacon (1561-1626), René Descartes (1596-1650) and Isaac Newton (1725-1807) (Rifkin 1980:19). Bacon in his *Novum Organum* of 1620 reacted against the Greek's emphasis on the *why* of things and concentrated rather on the *how* of things. The method he alludes to is the scientific method of induction that would separate the observer from the observed and provide a neutral forum for the development of 'objective knowledge', which would allow us to take 'command of things natural - over bodies, medicine, mechanical powers and infinitive others of this kind' (Rifkin 1980:20). The path for Bacon's work was prepared by the process of disenchantment with the world. Descartes, a mathematician, followed in Bacon's footsteps and saw mathematics as the source of all things (Appleyard 1992:49ff). The natural order now left no room for a God who could change the operating rules if he so wished, since the total predictability of the mechanical paradigm excluded this.

The mechanistic view of nature which denied nature any capacity for self-movement and interiority was designed, in part, to support a theological voluntarism, the idea that the transcendent God imposes his will through these laws upon the world. The mechanistic view, however, became so satisfactory that it was freed from its original association with the imposed will of God and a dualistic view of human beings as composed of a spiritual soul and mechanistic body (see Cobb 1988:103). With Newton's *Principia* the mechanical world-view matured. Newtonian science, as embodied in applied mechanics, became the essential ingredient of the Industrial Revolution. Humanity now had a new purpose in life. Gone was the medieval goal of seeking perfection in the next world. In its place was the new idea of seeking perfection in this world.

The mechanical world-view, basic to modernism, was attacked by postmodern thinkers who denied the possibility that reality could be represented in any truly objective fashion.⁷

5 It is interesting to note that some Protestant thinkers believed that experimental science promised a way of reversing the effects of original sin, a way of making a better world that may in some way mirror the perfection of God's heavenly kingdom (see Brooke 1991:111).

6 Der Entstehung eines Weltbegriffs in dem die Welt ein unendliches, unbestimmtes, allein durch Naturgesetze zusammengehaltenes Universum ist (Schrey 1962:1621).

7 When the mechanistic-materialistic world-view could no longer be applied in subatomic physics, much of the scientific and philosophical community concluded that we were condemned to paradox and unintelligibility, because reason remained identified with the mechanistic view (Cobb 1988:104).

They deconstructed the Newtonian individual as a self-conscious agent and brought the Enlightenment project under severe attack. Their critique was levelled especially on the cultural, social, linguistic and philosophical levels. The veil of language made it impossible for us to get to reality 'out there'.

We find ourselves in a postmodern situation where certainty and unity have been replaced by a culture of uncertainty, provisionality, contingency and conditionality. This concerns values,⁸ truths, interpretations and world-views. Everyone seems to come forward with new and often violently opposed views of the world and one hears endless talk about Judaeo-Christian values, Afrocentric values, Muslim truths, Eastern truths, Western truth - each providing a complete programme for excluding others (Said 1994:67-69). Postmodernism proposes no answer to the problems of modernity. It has simply woken us from our uncritical slumber. It also burdens us with the responsibility to accommodate the different legitimate worlds that are part of our reality but which we have neglected in the past.

3. The world-view of natural science

3.1 One specific scientific world-view does not exist

It does not make sense to speak of the status of 'the' scientific world-view because a uniform way of looking at things does not exist. Feyerabend (1994a:138-139) distinguishes between what he calls the Aristotelian and Platonic approaches to science. The Aristotelian trend⁹ represents those scientists who stick closely to the facts, design experiments that clearly establish one or other of two alternatives to avoid far-reaching speculation (closed world-view).¹⁰ The Platonic trend encourages speculation and is ready to accept theories that relate the facts in an indirect and highly complex way (open world-view). What Feyerabend found surprising is that both these trends resulted in special domains and in highly theoretical branches of biology and highly empirical subdivisions of astrophysics. He concludes that science contains many different and yet empirically acceptable world-views, each one containing its own metaphysical background.

A single coherent world-view that underlies all of science is, according to Feyerabend (1994a:141), either a metaphysical hypothesis trying to anticipate a future unity, or a pedagogical fake. A more realistic account would accept that there is no simple 'scientific' map of reality - or, if there were, it would be much too complicated and unwieldy to be grasped or used by anyone. But there are different maps of reality, from a variety of scientific viewpoints.

-
- 8 Bohm (1988:59-60) even speaks about a postmodern physics which integrates matter and consciousness and does not separate facts, meaning, and value. Science would then be inseparable from a kind of intrinsic morality, and truth and virtue would not be kept apart as they currently are in science. This proposal runs contrary to the prevailing view of what science should be, which is a morally neutral way of manipulating nature, according to the choices of the people who apply it.
- 9 This approach stresses close contact with experience and objects to following a plausible idea to the bitter end. It is, however, not always so easy to stick to these demands. For example, the essential requirements of the Copenhagen interpretation that the experimental set-up must be taken into account when making observations, is seldom met in observations with cosmological import (see Feyerabend 1994a:136, 142).
- 10 Ward (1990:99-100) indicated that one could confirm a truly closed system only if it could, in principle, be completely specified and accurately predicted in all circumstances. But this has been ruled out as impossible both by the Uncertainty Principle, which rules out a complete specification of all physical forces at the same moment, and by studies of the dynamic of complex systems far from equilibrium, which show that we would need an infinite amount of information to make such predictions. There is every reason to think that no consistent model that humans can devise will ever produce a complete survey of its physical structure.

These maps cannot simply be pasted together in an attempt to establish a single coherent world-view. Feyerabend (1994a:142) indicates that Geller and others have cast doubt on the homogeneity assumption which plays a central role in cosmology. We have, for example, an over-emphasised materialism in molecular biology, and a radical subjectivism in, for example, some versions of quantum measurement and the anthropic principle. There are many fascinating results, speculations, and interpretative proposals and it is certainly worth knowing them. But pasting them together into a single coherent 'scientific' world-view - a procedure which has the blessing of the Pope - is going too far for Feyerabend. After all - who can say that the world which so strenuously resists unification really is, as educators and metaphysicians want it to be - tidy, uniform, the same everywhere? Besides, a 'paste job' eliminates those conflicts that have kept science going in the past and will continue inspiring its practitioners if preserved.

Although one is inclined to agree with Feyerabend, it can be argued that pasting jobs or rational constructions are so inherently part of our/others' world-view that we cannot have a world-view without them. The danger is that a specific world-view and its construction may be elevated to an exclusive position.

Science may concern real facts and figures, carefully selected models and methods, to be able to make its objective claims. But these very claims and assumptions, portray a certain world-view and have determined to a large extent the present world-view of the West. In practice, therefore, science does not always decide on how it is referred to, believed in, and integrated into a world-view held in a specific society. This fact makes it even more unlikely that only one scientific world-view exists. The science story is claimed and reinterpreted by many interest groups in society. Science, and its practical advantages is still in high repute with the public. This 'science', however, does not exist. What the so-called 'educated public' seems to assume is that the achievements they read about and the threats they seem to perceive come from a single source and are produced by a uniform procedure (see Feyerabend 1994a:144-145).

The implication of an alleged theory of everything (TOE), which proposes to present a fully integrated, logically coherent, and satisfying explanation of the cosmos, is that the totality of human life must also be radically affected by this theory. Many voices have been raised against this so-called theory as its claims seem to be premature, and an overstatement of the facts at our disposal.

3.2 Science, values and belief

One cannot overestimate the importance of the world-view of science and the influence its values, attitudes and orientation exert. The world-view that physics provides is still playing a crucial role as a foundation for the general mode of thinking which prevails throughout society.

The domain of science does not, strictly speaking, include the meaning and purpose of human existence. A scientific world-view, operating within strict positivistic parameters, cannot really allow factors such as values, aesthetics, beliefs and so on to influence it. To extrapolate from what is empirically observable to everything that exists involves a logical *non sequitur* (Holmes 1983:41).

It is, however, not only bare facts that are conveyed, but also values. Bohr (1988:67-68), for example, sees matter and consciousness as inseparably integrated, which implies that meaning and value are as much integrated aspects of the world as they are of us. He sees it as the task of postmodern science to overcome the separation between truth and virtue, value and fact, ethics and practical necessity.

However, the natural sciences are not value-free, nor can personal belief systems and commitments be totally ignored in the work of a scientist. It is not so that science does not tell us how to live. One cannot agree with Wolpert (1992:172-173) that science has nothing to contribute on moral issues and that it must be left to the politicians, philosophers and finally all citizens to decide on the sort of society in which they will live. Just as scientists are also politicians and philosophers and citizens, just so can science, technology, lifestyle and world-view not be separated. Scientists are, like all of us, not always aware of how much they are influenced by a specific world-view.¹¹ A scientist need not accept all aspects of a world-view to be influenced by it.

Although the findings of the sciences may be stated factually, without values or ideologies attached to them, the inferences made from these findings, and the applications and implementations thereof, are bound to values and specific interests. Science may be value-free, but the implications of its findings and applications are that science (like theology) offers salvation (Midgley 1992:1), that modern society depends on applied science, and that science still provides the most viable solution to existing societies.

The power of any world-view is directly linked to the value that underlies it. Without any determinative values, world-views are simply impotent stories. The notion of value, however, is linked to that of purpose and meaning. Keith Ward (1990:96ff) points out that the progress of science, which began with the firm rejection of purpose in nature in the seventeenth century, may be interpreted as pointing towards a form of purposive explanation in the twentieth century. The main difference is that this purpose is connected with the general structure of the universe, not with particular occurrences within it. The appeal to purpose points to a dimension of explanation which is different from that of the experiential sciences. It is especially the new cosmology story that underscores this. After the new cosmology, scientific theories will no longer be seen simply as objective laws. Scientific understanding will be valued as that power capable of evoking in humans a deep intimacy with reality (Swimme 1988:51).

Examples of the evocative power present in the new cosmology are the theory of everything, the anthropic principle, the kenosis theory, the presence of symmetry and beauty in nature, and so on.

3.3 Critical realism as world-view

Realism seems to be the most acceptable approach in both science and theology for describing reality. It is a good example of how a specific approach as a subelement in a specific world-view develops. Although realism seems to represent a unified approach against anti-realism, it has divided into many sub-positions, each representing a different perspective.

Realism, in all its variations, including its relation in the postmodern debate,¹² is still much discussed. Murphy (1993:356-357) indicates that critical realists use concepts to construct claims about reality, without asking whether these concepts are indeed the best to apply. The history of science is a history in which conceptual systems are rejected and

11 Feyerabend (1994b:158ff) has indicated that scientists are not always willing to acknowledge a specific world-view. If the world-view were to be presented in its full splendour it would not sound very scientific. It is therefore hidden, although it still affects the debate through insinuations, slogans and attitudes. According to him, most arguments about realism have this truncated character.

12 Van Huyssteen's postmodern critical realism, criticised by Murphy (1993:355), offers more manoeuvrability to critical realism, but not without some obstacles like the reference issue.

replaced. We must ask what the criteria for acceptance or rejection of conceptual systems are.

Realism accepts that there is an objective existing world, whether there are thinking subjects or not. Although one can construct a theory or a model, or a view of reality or an interpretation of the world, one cannot construct reality and one cannot construct the world, unless one wants to live in a world of one's own (see Poole 1995:47).

But there are different interpretations of this one reality, different ways of approaching, depicting, and describing it. The shape of rationality in religion differs from that in science. Describing reality in a textual discipline differs from one where reality is empirically described. To do justice to different ways of approaching reality, to different disciplines, epistemologies and modes of thinking, a pluralist critical rationalism, as proposed by Agassi (1991:100ff), seems to offer a solution. Pluralism disagrees with relativism and agrees with critical rationalism in proposing that some answers are rejected and are not to be allowed. But the pluralist agrees with relativism in asserting that different criteria of choice are legitimate. Where relativism allows a melting pot, pluralism recommends diversity.

Realists may deny that they are influenced by world-views when conducting their experiments and formulating their theories. World-views, however, cannot be presented as person-independent entities, or as facts and/or theories; they have to be related to the individuals and the communities they affect. And a community holding realism as a world-view simply cannot be shaken by contrary facts. If it is shaken then this means that the world-view is already breaking up or that the facts presented are part of a powerful rival world-view (Feyerabend 1994b:156).

4. The Christian reaction to the world-views of science and technology

4.1 The close relationship between Christianity and natural science

The history of the West testifies, apart from some exceptions, to the fact that science and religion shared the same cultural environment, but that the theologians of Christianity have found few points of contact with developments in natural science. The effort to link scientific thought to religion was gradually reduced until it became quite unfashionable to try to do so at all. Kepler, for example, still gave the doctrine of the Trinity physical meaning in the structure of the cosmos. The central sun symbolised God the Father; the surface of the spherical universe, God the Son; the intermediate space, God the Holy Spirit. Galileo, however, argued that the earth's motion was not a matter of faith (Brooke 1991:93, 98). It is not without penalty, according to Pannenberg (1993:75), that theology has turned away from the task of a theological permeation and digestion of scientific thinking in modern times. Some degree of autonomy was maintained by protesting against certain theories, like that of evolution which opposed the biblical message of God's creation out of nothing. Theologies, nevertheless, ignored most scientific theories, accepted some and rejected or reinterpreted others. The general feeling that science and education were the way to success was not denied but upheld by the church. The Christian world-view at grass roots level today, accepts the world-view of science and technology as the only road to affluence and better living.

To react negatively to the basic presuppositions, scientific method, or findings of the natural sciences from a Christian point of view is almost impossible. Christianity in the West shares the same cultural matrix as that of the natural sciences; both adhere to the same principles of what science is and how scientific research should be conducted. Wolpert (1993:144ff) considers science and religion to be incompatible. Science is based on reason

and religion on faith. He agrees with Tolstoy that science is meaningless for religious purposes because it gives no answer to the questions 'What shall we do?' and 'What shall we be?'

The interaction between science and theology seems, however, to be in one direction only. Most scientists refrain from any moral statements which make Christians the only agents in this field. Although science tries to be neutral and objective in accordance with its method and presuppositions, applied science cannot be so. The ethical arguments conducted in connection with applied science are the responsibility of all members of a society.

That religion has always influenced scientists to some degree cannot be denied. As an example one can mention the principle of complementarity that Bohr used in quantum mechanics to show how the human and natural sciences influence each other (described by Brooke 1991:332ff). William James's idea of a stream of consciousness struck Bohr with the implications it had for introspective analysis. To interrupt the stream, by looking, as it were, at one's own thoughts before they reached their terminus, was to destroy them. Subject and object were intimately bound together. The role of the subject in disturbing the object was central to Bohr's interpretation of quantum mechanics, in which the image of a detached observer was renounced. His concept of complementarity was partly sustained by the belief that it could illuminate the paradoxes of psychology as well as those of physics. A second example is the input Bohr received from Soren Kierkegaard (1813-55) who stressed the primacy of human choice and decision. Human life is a series of either/or choices. Attempts to achieve an overarching coherence of thought were doomed to failure since, in the practice of life, one had to choose between incompatible courses of action. This is a long way from subatomic physics - and yet the parallel is there. The physicist had to make a choice between mutually exclusive descriptions. Bohr assimilated the view of the human subject with which his interpretation of quantum physics resonated.

The models and metaphors scientists use to try to explain what they observe come from everyday-life experiences - of which religious convictions form an important part.

Giving meaning to life and contributing to the dominant world-view of our time is not the exclusive prerogative of the church, religion and religious groups any more. To some extent the religious spokesmen must be content to follow, while others take the lead. This is the case not only with the natural sciences and technology, but also with the political arena and social reality. The church cannot but react to proposals and problems posed from the reality outside the church. This does not imply that the church should refrain from participating in what is seen by many as the secular part of the discussion, or remain exclusively within a spiritual realm where contact with outside reality is not seen as important. The task of the church is inexorably linked to this world, its self-explanation, its future, its technological, ecological and ethical challenges. The question is how this participation in world-view formulation should be accomplished.

4.2 The world-view of science and the non-Christian religions

In spite of protest, the overall picture presented by science is accepted to be intact. But must the world-views of different cultures and religions succumb to the master world-view determined by the current scientific world-view?¹³ What are the limits of the present

13 Because of this very claim to present a universal valid world-view, science has been accused of becoming a new religion. In Appleyard's (1992:228-229) words 'science now answers questions *as if* it were a religion and its obvious effectiveness means that these answers are believed to be the truth - again *as if* it were a religion. Faith has been and will continue to be eroded by science.'

dominant science world-view and to what extent will it penetrate the world of religions? How must religions react in the light of their susceptibility towards a global cognitive imperialism? Although one should say 'yes' to the world-view of science, this does not mean 'yes' to any kind of construction which may force people into a single mould. The fact that most people adhere to a scientific world-view does not imply that other world-views and their specific meanings may not be taught in school. One may be committed to certain values and beliefs and simultaneously be self-critical and open towards other interpretations, without simply favouring one religion. But is this truly possible?

Writers on new cosmology predominantly present a world-view which integrates the findings of the new physics with the main theistic lines found in Christianity. In spite of some variables in the proposal, the overall picture is one in which the fascination, beauty, order and rationality of the cosmos with its finely-tuned and kenotic structure, are linked with the Christian God as creator, redeemer and sustainer, immanent in and responsible for the process.

The prevalence given to the Christian religion does, however, throw a critical light on the scientific nature of this process. How can new cosmology claim to be so perfectly compatible with Christianity before the creation stories, models and metaphors of all other religions and philosophical world-view models have also been taken into account? To simply link the findings of new physics with only one religion is to make a value judgement on the truth claims of that specific religion. The fact that white, Western Christians, especially, are involved in the debate explains why Christianity is more integrated in the debate than other religions.

The fact that the debate has thus far excluded the other world religions to a large extent, places a question on the scientific objectivity of the debate and makes it susceptible to an accusation of constructivism.¹⁴ The new consciousness resulting from the historical study of world-views along with the encounter of alternative living world-views has brought, according to Cobb (1988:100), more of this unconscious material into consciousness, thereby relativising all world-views, making all world-views problematic. The relativising of world-views also involves the relativising of all religious traditions of humankind.

One can imagine that the effect of the world-view of science on Christianity will not have as severe an impact as it will on other religions, because of Christianity's close relationship to the whole process.

4.3 Christian responses to the world-view of natural science

It is almost impossible to capture the variety of responses from Christianity on aspects of the world-view of natural science. Because the world-view of science affects the total cultural environment, stronger protest is voiced from the side of philosophers, writers and ecologists than from the side of theology. Critique is limited to some claims and effects of the world-view of science which normally falls outside the strict scientific processes themselves. This could be captured in the protest against the effects of applied science; the impossibility to slow down or halt technocracy with its detrimental environmental effects; the unwillingness of scientists to admit the provisional nature of their theories; the fact that

¹⁴ Constructivism can be seen as the perspective whereby individuals - through their own mental activity, experience with the environment and social interactions - progressively build up and restructure their schemes of the world around them. It has at its centre the importance of meaning as constructed by individuals to make sense of the world (see Poole 1995:45).

most scientists seem to ignore the objections raised against a modernist approach; the sustained claim that only science can better our lives, and so on.

One cannot ignore the fact that many scholars tend to forget that the relationship theory-scientific reality is not totally congruous with the relationship theory-social reality or theory-textual reality. For scientists issues like reference, language barrier, the subject-object relationship, inter- and meta-text and so on, are seemingly not as problematic as they are for theologians, philosophers and literary theorists.

At a grassroots level many Christians reject aspects of the world-view of science because they still hold to a literalistic text reading, discarding the works of historical criticism, ignoring the importance of the cultural and social background of biblical texts with their specific world-view, style, genre, and so on. Inviting critical debate about defunct views is like playing chess after checkmate.

Concerning the claims of science, especially as they are portrayed in the media by science fiction writers, one cannot help getting the impression that science has become the religion of our age.¹⁵ But science cannot become the new religion of its day because it simply lacks the essential features of a religion. Science, like religion, boasts of a revelation - but this revelation is revealed through the endeavour of man. Man describes this revelation as a revelation of the laws of nature. Science still needs religion to be able to posit God as the creator of laws. Science can indicate the extraordinary composition and constellation of a multitude of factors that make life possible - but science is still in need of a system that demands belief in a God responsible for this. Science can indicate beauty and symmetry in nature but cannot induce worship. Science can offer ways of improving our lives, but in the last instance cannot promise self-fulfilment. Science can indicate the coming termination of our planetary system, but it cannot offer a hopeful eschatology. Science can indicate the importance of reverence for life and the very precarious balance of ecological systems, but it can make no moral judgements or ethical appeals. If science is interested in linking its theories and findings, emotions and fears, its world-view and constructions to a god, then it has to look to religion. World-views are rooted in faith and matters of ultimate concern. Faith integrates a comprehensive image of an ultimate environment. Faith is the cohesive power in which the sense, values, traditions, rationality and all other experiences of human life are bound together. A world-view is argued from, rather than argued to, because through faith it functions as an unquestionable presupposition. A world-view is, however, confronted by the demands of life as a whole (Olthuis 1985:156-158). In so far as science has detached itself from the faith link and from value judgements it cannot deal with ultimate questions. It is clear that faith in God has to be gained in areas of life other than that of scientific knowledge (Pannenberg 1993:112-113).

Religion must protest against many pretensions on the part of some scientists - especially those who claim that science is the only way and means into a better future, that science alone can redeem humankind. Religion must fend for its stories, belief systems and even its myths, because they incorporate values and motivations that are necessary for us to continue on our way.

15 Ferré (1988:88-90) speaks of religious world models created by the science images of the Perfect Machine, the Ultimate Particle, and the Pure Object. The Perfect Machine is the clockwork mechanism universe in which nothing ever goes awry, the Ultimate Particle suggests that the smallest unit, underlying all other things can explain everything, representing Being in and of itself. Its property defines reality, while all other properties are mere appearances. The Pure Object is the only way to truth. It is rid of any subjectivity, which includes our values of spontaneity, creativity and responsibility.

But a religion would be anachronistic if it ignored the knowledge of its day, if it refused to integrate the theories and models of science into its belief system. Religion would take the place of God if it limited his continuing revelation simply to a book, tradition or confession. Religion will make God a cultural artefact if it refuses to reinterpret outdated creation images and continues to read cosmic stories in a literal fashion. Religion must continually learn from the world of science. It can find in science allies who co-determine the world-view of our time and who express the same sentiments but in different words. Religion needs backup from natural science and technology to protest against the irresponsible implementation of applied science, self-consuming materialism and ecological carelessness.

4.4 Christian options in a maze of world-views

The theological doctrine of creation is not bound to any specific scientific hypothesis. It can claim different scientific models, which it deems fit to integrate into its own construction (Pannenberg 1993:102). There are, however, so many different models, world-views and constructions that many believers may prefer to hold to the world-view informed by the results of natural science. But it is exactly that nature which is researched by natural science that would have to be claimed by theology as the creation of God (Pannenberg 1993:74).

Although religion's roots are in the life-oriented domain of practical reason, says Ferré (1988:91), it is pushed by its own drive toward comprehensiveness to include the values of theoretical reason as well. Therefore it cannot but support science. The world-view reformulation of our time demands the mutual commitment of people from all sectors of life. Scientists from these different sectors must listen to and take cognisance of the various views and criticisms. The natural sciences play a vital role in co-determining the formation and reinterpretation of our world-views. They also participate in the forming and maintaining of values explaining life. The nature of reality is such that we need both theological and scientific concepts to make our way effectively (Murphy 1993:353).

We live in a world where a world-view projected by science fiction seems more realistic than one portrayed by Christian eschatology. For others, however, the experience of God is more unusual than science fiction. The worlds of science and theology, of faith and reason, of dream and reality are all in need of each other. One can only hope that the world-view designers of our time will be brave and ingenious enough to integrate all aspects important to humankind.

BIBLIOGRAPHY

- Agassi, J 1991. Pluralism and science. *Methodology and science* 24(1), 99-118.
- Appleyard, B 1992. *Understanding the present: Science and the soul of modern man*. London: Picador.
- Bohm, D 1988. Postmodern science and a postmodern world, in Griffin 1988:57-68.
- Brooke, JH 1991. *Science and religion: Some historical perspectives*. Cambridge: Cambridge University Press.
- Cobb, JB Jr 1988. Ecology, science, and religion: Toward a postmodern world-view, in Griffin, D R (ed), 99-128.
- Ferré, F 1988. Religious world modelling and postmodern science, in Griffin 1988:87-97.
- Feyerabend, P 1987. *Farewell to Reason*. London/New York: Verso.
- Feyerabend, P 1994a. Has the scientific view of the world a special status compared with other views? in Hilgevoord, J (ed), 135-148.
- Feyerabend, P 1994b. Quantum theory and our view of the world, in Hilgevoord, J (ed), 149-168.
- Griffin, DR (ed) 1988. *The re-enchantment of science*. Albany: State University of New York Press.
- Hilgevoord, J 1994. *Physics and our world*. Cambridge: Cambridge University Press.
- Holmes, AF 1983. *Contours of a world view*. Michigan: Eerdmans.
- Ladrière, J 1977. *The challenge presented to cultures by science*. Paris: Unesco.
- Midgley, M 1992. *Science as salvation*. London: Routledge.
- Murphy, N 1993. The limits of pragmatism and the limits of realism. *Zygon* 28(3), 351-359.
- Olthuis, J 1985. On world-views. *Christian Scholars Review* 14(2), 153-164.
- Pannenberg, W 1993. *Toward a theology of nature*. Kentucky: John Knox.
- Poole, M 1995. *Beliefs and values in science education*. Buckingham: Open University Press.
- Rifkin, J 1980. *Entropy*. New York: Viking.
- Said, EW 1994. *Representations of the intellectual*. Vintage: London. (1993 Reith lectures.)
- Schrey, HH 1962. Das neuzeitliche Weltbild, in *Die Religion in Geschichte und Gegenwart*, Bd 6, 1621-1629. Tübingen: Mohr.
- Swimme, B 1988. The cosmic creation story, in Griffin 1988:47-56.
- Van Peursen, CA 1975. *Cultuur in stroomversnelling*. Amsterdam: Elsevier.
- Ward, K 1990. *Divine action*. London: Collins.
- Wolpert, L 1993. *The unnatural nature of science*. London: Faber & Faber.